

What is claimed is:

1. A capacitor comprising dielectrics formed on a surface of a conductor and an opposite electrode formed on a surface of said dielectrics; wherein said dielectrics is one of:

5 polyimide directly formed by electro-deposition, polycarboxylic acid resin derivatives formed by electro-deposition and composite dielectrics made of polycarboxylic acid resin derivatives formed by electro-deposition and oxide of a metal constituting said conductor.

10 2. The capacitor as defined in Claim 1, wherein said polyimide is a reaction product of aromatic tetracarboxylic acid di-anhydride and aromatic diamine having at least one carboxylic acid radical.

15 3. The capacitor as defined in Claim 1, wherein said polycarboxylic acid resin has at least one carboxylic acid radical in its chemical structure.

4. The capacitor as defined in Claim 1, wherein said polycarboxylic acid resin is polyacrylic acid derived resin.

20 5. The capacitor as defined in Claim 1, wherein at least a part of said opposite electrode is made of conductive high polymer.

25 6. The capacitor as defined in Claim 5, wherein said conductive high polymer is one of polypyrrole, polythiophene, and their derivatives.

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7. The capacitor as defined in Claim 5, wherein said conductive high polymer is formed using one of:

chemical oxydation-polymerization; and

5 both chemical oxydation-polymerization and electro-polymerization.

8. The capacitor as defined in Claim 1, wherein one of said conductor electrode and opposite electrode is one of a metal foil and a metal layer formed on a substrate.

9. The capacitor as defined in Claim 8, wherein said metal layer is formed by one of vacuum process and plating.

10. A capacitor comprising dielectrics formed on a surface of a surface-roughened conductor and an opposite electrode formed on a surface of said dielectrics; wherein said dielectrics is made of one of:

polyimide directly formed by electrodeposition, polycarboxylic acid resin derivatives formed by electro-deposition and composite dielectrics made of polycarboxylic acid resin derivatives formed by electro-deposition and oxide of a metal constituting said conductor.

11. The capacitor as defined in Claim 10, wherein said polyimide is a reaction product of aromatic tetracarboxylic acid di-anhydride and aromatic diamine having at least one carboxylic acid radical.

12. The capacitor as defined in Claim 10, wherein said polycarboxylic acid resin has at least one carboxylic acid radical in its chemical structure.

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13. The capacitor as defined in Claim 10, wherein said polycarboxylic acid resin is polyacrylic acid derived resin.

14. The capacitor as defined in Claim 10, wherein at least a part of said opposite electrode is made of conductive high polymer.

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15. The capacitor as defined in Claim 10, wherein said conductive high polymer is one of polypyrrole, polythiophene, and their derivatives.

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16. The capacitor as defined in Claim 10, wherein said conductive high polymer is formed using one of:

chemical oxidation-polymerization; and

both chemical oxydation-polymerization and electro-olymerization.

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17. The capacitor as defined in Claim 10, wherein one of said conductor electrode and opposite electrode is one of a metal foil and a metal layer formed on a substrate.

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18. The capacitor as defined in Claim 10, wherein said conductor electrode is an etched aluminum foil.

19. The capacitor as defined in Claim 17, wherein said metal  
5 layer is formed by one of vacuum process and plating.

20. A capacitor made by laminating a plurality of capacitor elements, said each capacitor element comprising:

dielectrics made of organic high polymers formed on one of a  
10 surface-roughened and perforated conductor; and  
an opposite electrode mainly made of conductive high polymer formed on a surface of said dielectrics.

21. A capacitor made by laminating a plurality of capacitor  
15 elements, said each capacitor element comprising:

dielectrics formed on one of a surface-roughened and perforated conductor; and

an opposite electrode formed on a surface of said dielectrics;  
wherein said dielectrics is one of:

20 polyimide directly formed by electrodeposition, polycarboxylic acid resin derivatives formed by electro-deposition and composite dielectrics made of polycarboxylic acid resin derivatives formed by electro-deposition and oxide of a metal constituting said conductor.

22. The capacitor as defined in Claim 21, wherein said polyimide is a reaction product of aromatic tetracarboxylic acid di-anhydride and aromatic diamine having at least one carboxylic acid radical.

5           23. The capacitor as defined in Claim 21, wherein said polycarboxylic acid resin has at least one carboxylic acid radical in its chemical structure.

10           24. The capacitor as defined in Claim 21, wherein said polycarboxylic acid resin is polyacrylic acid derived resin.

25. The capacitor as defined in Claim 21, wherein at least a part of said opposite electrode is made of conductive high polymer.

15           26. The capacitor as defined in Claim 25, wherein said conductive high polymer is one of polypyrrole, polythiophene, and their derivatives.

20           27. The capacitor as defined in Claim 25, wherein said conductive high polymer is formed using one of:

chemical oxydation polymerization; and

both chemical oxydation-polymerization and electro-polymerization.

28. The capacitor as defined in Claim 21, wherein one of said conductor and opposite electrode is one of a metal foil and a metal layer formed on a substrate.

5           29. The capacitor as defined in Claim 28, wherein said conductor is an etched aluminum foil.

30. The capacitor as defined in Claim 28, wherein said metal layer is formed by one of vacuum process and plating.

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31. The capacitor as defined in Claim 21, wherein said opposite electrode is made of conductive high polymer and graphite.

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32. The capacitor as defined in Claim 21, wherein said opposite electrode is made of conductive high polymer, graphite, and conductive adhesive.

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33. The capacitor as defined in Claim 21, wherein each of said conductor and opposite electrode is electrically connected so that a plurality of capacitor elements form an electrically parallel circuit.

34. The capacitor as defined in Claim 21, wherein said conductor is bonded by welding.

35. The capacitor as defined in Claim 21, wherein said opposite electrode is bonded by conductive adhesive to form a laminated body.

36. The capacitor as defined in Claim 21, wherein an insulating  
5 layer is provided on the capacitor element to insulate said conductor from said opposite electrode.

37. A method of manufacturing capacitors, said method comprising the steps of:

10 forming a polyimide film on a conductor using one of solution and dispersed solution containing polyimide as electro-deposition solution;  
drying and heat treating said polyimide film; and  
forming an opposite electrode on said polyimide film.

15 38. The method of manufacturing capacitors as defined in Claim 37, wherein said polyimide is a reaction product of aromatic tetracarboxylic acid di-anhydride and aromatic diamine having at least one carboxylic acid radical.

20 39. The method of manufacturing capacitors as defined in Claim 37, wherein water is contained in said electro-deposition solution.

40. The method of manufacturing capacitors as defined in Claim 37, wherein said conductor is one of surface-roughened or perforated  
25 metal.

41. A method of manufacturing laminated capacitors, said method comprising the steps of:

forming one of:

5 dielectrics made of organic high polymer, dielectrics made of organic high polymer and composite dielectrics made of organic high polymer and oxide of a metal constituting said conductor;

forming an insulating layer at least on said conductor;

10 forming an opposite electrode on said dielectrics to complete a capacitor element;

laminating a plurality of said capacitor elements; and

forming an external connection terminal.

42. The method of manufacturing the laminated capacitors as  
15 defined in Claim 41, wherein said dielectrics is formed by electro-depositing organic high polymer.

43. The method of manufacturing laminated capacitors as defined in Claim 41, wherein said compound dielectrics is formed by  
20 simultaneous progression of:

electrodeposition of organic high polymer; and

anodization of a metal constituting said conductor.

44. The method of manufacturing laminated capacitors as  
25 defined in Claim 41, wherein said opposite electrode is formed using one of:



chemical oxy-polymerization; and  
both chemical oxy-polymerization and electro-polymerization.

45. The method of manufacturing laminated capacitors as  
5 defined in Claim 41, wherein said opposite electrodes of said adjacent  
capacitor elements are bonded using conductive adhesive in said step of  
laminating a plurality of said capacitor elements.

46. The method of manufacturing laminated capacitors as  
10 defined in Claim 41, wherein pressure is applied during bonding using said  
conductive adhesive.